Structural Welding Inspection

DSA Circular 17-3

Reference: California Building Code, Title 24, Part 1, Section 4-333(c) Issued 05-15-07
Title 24, Part 2, Section 1701A.5.5 and 2231A

Discipline: Structural

This circular is intended for use by the DSA plan review engineers and field engineers to indicate an acceptable method for achieving compliance with applicable codes. Its purpose is to promote uniform statewide criteria for use in plan and construction review of projects within the jurisdiction of DSA which include State of California public elementary and secondary schools (grades K-12), community colleges, and state-owned or state-leased essential services buildings. Other methods proposed by design professionals to solve a particular problem may be considered by DSA and reviewed for code compliance.

This Circular also applies to testing laboratories, technicians and special inspectors working on projects under DSA jurisdiction.

1. Purpose: The purpose of this Circular is to clarify the minimum requirements and responsibilities for personnel conducting structural welding inspection. It is applicable to shop and field welding activities.

2. Background: The 2001 California Building Code requires constant special inspection of all welding operations except that continuous inspection is permitted for certain weld types in accordance with Title 24, Part 2, Section 1701A.5.

2.1 For welding, "constant" means constant presence of the welding inspector at point of welding, and that he or she inspects each pass as it is being done prior to subsequent weld layers. Constant inspection is applicable to the following types of welds: Multi-pass fillet welds, partial penetration groove welds and complete penetration groove welds.

2.2 For welding, "continuous" means the welding inspector must be in the vicinity of the welding during all phases, and shall inspect in a timely manner, before subsequent operations are performed. Continuous inspection is applicable to single pass fillet welds, deck welding, shear studs, hand rails, etc.

3. Qualifications: Welding inspectors shall meet the following minimum requirements:

3.1 Have valid certification as an American Welding Society (AWS) certified welding inspector (CWI) or senior certified welding inspector (SCWI) as defined in the provisions of ANSI/AWS QC1,

3.2 Have taken the AWS Open Code Book examination on ANSI/AWS D1.1, Structural Welding Code – Steel.

3.3 Be not less than 25 years of age, and

3.4 Must possess knowledge of the administrative requirements of Title 24 Part 1 and special welding inspection requirements of Title 24, Part 2.

4. Approval: A welding inspector shall be approved for each specific project prior to performing any work in accordance with Section 4-333 (c) of Title 24, Part 1 and

2231A of Title 24, Part 2. To be approved for a project the welding inspector may be required to demonstrate the following to the satisfaction of DSA:

4.1 The minimum requirements defined in Section 3 above,

4.2 At least 3 years experience in construction or inspection work on projects similar to the project for which the inspector is applying, and

4.3 That adequate time and attention will be provided to the project.

5. Inspection Duties:

5.1 Review and understand the applicable portions of the DSA approved plans, specifications, field changes and other DSA approved documents. Approved shop drawings, erection drawings, referenced codes and standards must also be reviewed and understood. (Note that shop/erection drawings are NOT DSA approved documents and shall NOT be used as a basis for determining compliance).

5.2 Verify that materials to be welded are the specified grade, type, size, thickness, etc. required by DSA approved documents for the project.

5.3 Review manufacturer's material test reports. Sample any unidentifiable material for testing. All testing of materials must be performed by a laboratory accepted in the DSA Laboratory Evaluation and Acceptance (LEA) Program.

5.4 Verify that all applicable welder, welding operator, and tack welder qualifications are available, current, and accurate.

5.5 Verify that a written Welding Procedure Specification (WPS) is available on site for each type of weld, that the WPS is in compliance with all requirements, and that the WPS has been approved as required by the construction documents.

5.6 Witness all Procedure Qualification Tests required for non-prequalified welds and verify that Procedure Qualification Records (PQR) are compliant with all applicable requirements.

5.7 Verify that all welding consumables comply with the DSA approved documents and the approved WPS. Verify that all electrodes are properly stored.

5.8 Verify that the welding current and voltage are within the WPS parameters by using a calibrated hand-held volt/amp meter. Readings should be taken as near the arc as possible.

5.9 Verify that joint preparation, assembly practice, preheat temperatures, interpass temperatures, welding techniques, welder performance, and post-weld heat treatment meet the requirements of the DSA approved documents, WPS, and applicable AWS code.

5.10 Conduct visual inspection of the work: Verify size, length, and location of all welds. Verify that all welds conform to the requirements of the AWS code and the DSA approved documents. Weld size and contour shall be measured with suitable gauges.

5.11 Mark completed welds, parts, and joints that have been inspected and accepted with a distinguishing mark, tag or dye stamp. The mark shall include: Testing laboratory initials (if applicable), inspector's initials, inspection date and status.

5.12 Schedule or notify those responsible for nondestructive testing (NDT) technicians in a timely manner, after visual inspection and acceptance is complete, and the assembly has cooled. See DSA Circular 17-2 for further information regarding NDT.

6.0 Reporting:

6.1 Provide daily inspection reports that clearly describe the inspection process. The report shall document all inspection duties listed in Section 5. above. Reports shall include a systematic list of accepted and rejected welds, parts, or joints. Reports shall clearly document weld locations by grid line, elevation or other acceptable means.

6.2 Reports shall reference the details on the DSA approved documents used as a basis for inspection.

6.3 Inspection reports must state that the work was inspected in accordance with, and met the requirements of, the DSA approved documents. Reports must be submitted as required by C.C.R. Title 24, Part 1, Section 4-333 (c). A sample special inspection form (DSA 250) is available on the DSA web site.

6.4 Reports shall be sent to the school district and copied to the architect, structural engineer, project inspector and DSA within 14 days of the date of the inspection. For field welding, reports shall also be presented to the project inspector on a daily basis. Reports indicating non-compliance shall be submitted immediately.

6.5 At the conclusion of the work, the welding inspector is required to sign and submit a verified report. The verified report shall be made on form (DSA 292) available on the DSA website.

7.0 Failure to Perform: Failure to inspect in a professional and competent manner, report defective work, file all required reports in a truthful and timely manner, or fulfill any other duties defined by the code may have serious consequences for the welding inspector. These consequences include but are not limited to withdrawal of DSA approval, and/or denial of any future DSA approval to work as a welding inspector on projects under DSA jurisdiction.